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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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FOREST INSECT SURVEYS, SHASTA NATIONAL FOREST

Season of 1939

by
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Berkeley, California
December 29, 1939

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Berkeley, California
December 29, 1939

FOREST INSECT SURVEYS, SHASTA NATIONAL FOREST

Season of 1939

APPROVED BY:

_____
Senior Entomologist, In Charge

SUBMITTED BY:

_____
Agent

REGIONAL FOREST INSECT SURVEYS, SHASTA NATIONAL FOREST

Season of 1939

INTRODUCTION

The regional forest insect survey of the east side portions of the Shasta National Forest is conducted annually by members of the Berkeley Laboratory, Bureau of Entomology and Plant Quarantine, to determine the current infestation conditions. Loss surveys of permanent sample plots, together with general reconnaissance of the area form the basis for this report. Unfortunately, the number and distribution of the sample plots is such as to form a poor basis for making a quantitative estimate of loss for the area as a whole (Fig. 1). Development of a more adequate survey coverage of the Shasta areas is a desirable extension of the Bureau's survey activities.

A three man survey party headed by G. F. Weaver made the annual loss cruise of the permanent survey plots shown in Fig. 1. Eight recently established 20 acre plots in the Burney area were cruised by R. C. Hall. Supplementary observations on infestation conditions and reconnaissance work was done by P. C. Johnson, in connection with work on the Hazard Inventory Project, and by K. A. Salman.

ORGANIZATION OF SURVEY AREAS

Final organization of the Shasta survey areas into homogeneous entomological units must be deferred until analysis of data collected during the past two years by the Hazard Inventory project has been completed. Completion of the Hazard Inventory work in the southeastern portion of the forest makes it possible to consider infestation conditions on eight established units.

For the purposes of this report it seems desirable to separate those portions of the Shasta which have been covered by surveys this season into three broad areas. These can be defined chiefly on the basis of definite topographic features and represent different environmental types. The South Shasta area includes that portion having drainage to the south and into the Pit River. It is bounded approximately by the ridge between Mt. Hoffman and Mt. Shasta on the north and by the range line between R 1 E and R 2 E on the west. The McCloud River area is considered to include the basin southeast of Mt. Shasta which is drained by the McCloud River. The North Shasta area is defined as that portion north of the ridge between Mt. Hoffman and Mt. Shasta with drainage into the Klamath Basin. This latter area includes the Goosenest district.

GENERAL IMPRESSIONS OF CURRENT INFESTATION CONDITIONS

In general insect activity during the 1939 season was greater than that reported in 1938.

Ponderosa Pine

Current infestations are characterized by various conditions which may be taken to indicate continued increases in insect activity next season. Though basal examinations of infested trees can be used only to indicate a general trend of insect activity, they show that the western pine beetle was responsible for a high percent of the current mortality in ponderosa pine. The California flathead borer, mountain pine beetle and mixed infestations were found in a low percent of the infested trees.

Losses in ponderosa pine were further characterized by a preponderance of Ips top-killing followed by attacks by the western pine beetle. This infestation type is to be found in several areas, but is more commonly found in the pure pine type stands. Ips attacks occurred more often in the thrifty than in the older and decadent type of tree. Many of the single infested trees as well as a large proportion of the group kills are believed to contain the engraver-western pine beetle type of infestation.

Western pine beetle broods in mature trees are heavy and late season attacks are estimated to occur in nearly normal proportions. Grouping tendencies are evident in the 1939 infestation to a somewhat greater degree than was found in 1938. Groups of from six to ten trees were found occasionally throughout the area while two to four tree groups were common.

Sugar Pine

In sugar pine, activity was reported in the Angel's Meadow tract (T 39 N, R 1 W, M.D.M.) in the McCloud River Valley (3). An examination of this area in July revealed vigorous mountain pine beetle attacks of a disturbing character. Though infested trees were scattered throughout the area and were not particularly numerous, the unusual vigor of the attacks on the larger trees was resulting in considerable volume loss. Late season developments on this area indicate that the infestation is increasing in a manner similar to that of current sugar pine infestations in other west side areas to the south.

Lodgepole Pine

Infestations of lodgepole pine in the stands surrounding Medicine Lake continued to show epidemic tendencies during the 1939 season. A fall control project has been recommended to treat current mountain pine beetle infestations in those stands. (4)

Douglas and White Fir

Insect activity and loss in Douglas and white fir has increased greatly over that of the 1938 season. Loss in Douglas fir in some areas has been chiefly the result of successive attacks of the Douglas fir flathead borer. However, the Douglas fir beetle also has been more active than usual this season, particularly in portions of the McCloud River Valley south of the McCloud River. The fir engraver beetle is largely responsible for loss in white fir and basal examinations of infested trees show heavy broods of this insect. A summary of loss in Douglas and white fir, as recorded on three survey plots, is given in Table II.

CONDITIONS ON SPECIAL AREAS

South Shasta Area

But six survey plots sample the virgin stands in the eight units of the South Shasta area. This small sample makes it inadvisable to attempt to prepare loss estimates for these units, shown on the accompanying Hazard map, fig. 2. The plot loss figures for the past three years are given in Table I. As predicted by R. C. Hall in 1938 (2), there has been a substantial increase in the amount of loss occurring in 1939 over that of the previous year. A 40 percent increase is recorded by the plot record and the average estimated 1939 loss amounts to 94 b.m. per acre.

Wiley Ranch and Lava Units: Current insect activity on these units is considerably increased over 1938, and losses are moderately high. The 1939 estimate averages from 100 to 110 b.m. per acre. Group killing was found to occur frequently in these units, a condition believed due in part, at least, to the composition and general physiological condition of the stand.

Dana Unit: While no alarming conditions were found in this unit losses are fairly heavy, averaging about 100 b.m. per acre and current activity is greater than that of past season. The larger and more valuable trees predominated in the infestation.

Cayton and Dickson Flat Units: Although there has been some increase in the current insect activity on these units, the losses sustained are believed to be some of the lowest on the South Shasta area. The estimated 1939 loss is expected to average about 65 b.m. per acre.

1939 logging operations have extended the cutover area in the Dickson Flat Unit. Insect control work involving the salvaging of values in infested trees was carried on during 1939 along many of the roads in this area on the initiative of a private lumber company. In addition the same company experimented with control of forest insect infestations by salvaging highrisk trees on a 1440 acre tract in the Cayton unit.

Burney Falls Unit: A better sample of infestation conditions on this unit was made possible by the addition of eight 20 acre plot samples to that of the previously established 320 acre plot; however, these new plots do not permit an accurate estimate of loss prior to 1939. The average loss recorded by this sample amounted to 106 b.m. per acre as shown in the summary of plot loss records given in Table III. Current insect activity is considerably increased over that of 1938, and activity seems to be greatest in the fringe stands along the eastern boundary of the unit. Although no very large groups were found in this unit, small groups of from two to four trees are common.

Bear Creek and Clark Creek Units: No outstanding insect activity is evident on these units. At present they are not sampled by plots and extension of the survey system should provide for establishment of plots in these areas.

Other Virgin Stands: Near Harris Mountain, in the northwestern corner of the South Shasta area a block of privately owned timber has suffered heavily from single tree and group infestations in ponderosa pine. Apparently active infestations started during the 1938 season and have continued during the entire 1939 season. Though no estimates can be made of the total seasonal loss, due to the lack of a sample of the infestation, salvage logging of infested trees carried on by the owner during 1939 should help to reduce the infestation.

Cutover Area Infestations: In 1938 relatively heavy losses in the selectively cut stands near Porcupine Butte were reported. Reconnaissance of the same area during 1939 failed to reveal a continuation of that infestation or any considerable loss in the large block of cutover land which covers most of the northern half of the South Shasta area.

McCloud River Valley Area

Estimates of infestation conditions in this area are based entirely on reconnaissance surveys.

Virgin Stands: Infestations in privately owned virgin stands in Trout Creek are similar to those reported for the Harris Mountain section of the South Shasta area. Group and single tree losses have been abundant during 1939. However salvage of infested trees in this area, which has been reported to have been carried on by the owner during the 1939 season, should help in reducing the loss.

South of the McCloud River sugar pine loss in mixed conifer type virgin stands has shown considerable increase during the season as a result of active and vigorous mountain pine beetle infestations. It is understood that control of this infestation by direct methods is contemplated by the owner during the winter season. Infestation of Douglas fir by the Douglas fir beetle, though relatively light, is much heavier than normal.

Cutover Areas: Insects are active in some of the reserve stands in this area. Losses for the most part have been group kills in dense pole stands and in the thrifty immature and mature types of reserve trees. Although the actual volume loss is not great, the removal of these reserve and future crop trees is of considerable consequence.

In 1938, overwintering broods of the western pine beetle, followed previous Ips topkilling injuries and killed groups of poles east of McCloud to near Bartle. Cooperative control work conducted by the Forest Service and the McCloud River Lumber Company was undertaken in the spring of 1939. Relatively little 1939 loss developed in the area covered by that control work.

Similar 1938 group killing occurred in the reserve stands northwest of Black Fox Mountain. However, control work did not extend to this area and the killing of scattered groups of poles and thrifty trees continued during the 1939 season. Although examination of brood development in the infested material showed that the broods were not heavy, this infestation should be carefully watched for future developments.

North Shasta Area

Virgin Stands: Most of the virgin timber remaining in this area is confined to the Goosenest area although there is a small amount occurring in isolated pockets and at high elevations along the south boundary of the area. Early season reconnaissance of these virgin areas, which contain no sample plots, indicated that current loss would be only slightly increased over that of the previous season. Later reconnaissance work in those stands showed no infestations that required special consideration.

Cutover Areas: Residual stands over much of the cutover area are in very poor condition. In spite of this, no great increase of insect activity occurred during the 1939 season. However, the summary of records for four cutover plots in the area (Table IV) shows that loss for 1939 is estimated to be maintained at the relatively high figure of 30 board feet per acre.

CONCLUSIONS AND RECOMMENDATIONS

The 1939 insect caused loss of all host species on the Shasta National Forest is definitely increased over 1938. Conditions indicate that this upward trend will continue during the 1940 season, and, if the infestation follows past cyclic behavior, is expected to show increases for several years.

Faced with this situation, the control of rising infestations is desirable, particularly if values in infested trees can be salvaged by

going logging operations or as a part of side operations established for that purpose.

In several parts of the areas covered by this survey past losses and present high hazards from future losses indicate that control is likely to be necessary in the future. A program of sanitation salvage logging is strongly recommended for such situations. Tentative results of a study of this type of insect control which is being made at the Black's Mountain Experimental Forest in the Lassen area show that the removal of high risk trees from the stand makes possible the complete utilization of values and reduces subsequent loss. While it is probable that risk will increase over a period of time after treatment and subsequent loss will tend to build up again, the effects of this type of action seem more lasting than those resulting from the use of direct control methods. Sanitation salvage control seems to offer the best means now available for reducing insect caused loss under the type of stand conditions now existing in some of the virgin stands on the Shasta forest.

In particular it is recommended that sanitation-salvage control methods be strongly considered for areas in the Burney Falls, the Wiley Ranch and the Lava Units of the South Shasta area where the Hazard Inventory has shown the hazard to be high. Preliminary classification of hazard in the Goosenest district, particularly in the vicinity of Grass Lake shows that similar high hazard conditions exist there. A final analysis of the risk classifications of stands in that area may show that indirect control by a sanitation-salvage cut will be desirable.

As an example of the severity of loss and risk conditions in these stands the record for the Burney area suffices. During the past nine years loss records have been maintained on a 320 acre plot in section 28, T 36 N, R 3 E. Applying that 9 year loss record to the approximately 17,000 acres of virgin timber land in that township, it is estimated that the accumulated loss for the 9 year period totals 14,025,000 b.m. of merchantable timber -- an average of 1,558,000 b.m. per year.

A 140.3 acre strip sample of risk conditions in the stand, which was taken as a part of the Hazard Inventory project, shows that an average of 2500 b.m. per acre now exists in high risk trees. However, certain stands in this area contain an even greater volume of high risk material.

The possible loss of this stumpage value should be sufficient to interest owners, public and private, in the possibility of utilization of values represented by means of a sanitation salvage program. This type of control has been recommended by Bongberg (1) for an area south of the Burney Falls unit where similar stand conditions exist.

The removal of this high risk material from these stands is recommended as a method for utilizing stumpage that otherwise would be lost and for reducing subsequent loss from forest insect infestations. It must be emphasized, however, that the removal of the high risk trees is not proposed as a means for completely eliminating insect caused loss. Undoubtedly subsequent loss will occur and periodic sanitation salvage cuts may be necessary to maintain a low loss condition until harvest cuts can be made.

TABLE I PLOT LOSSES - SHASTA NATIONAL FOREST

Plot No.	1937 Per Section No.Trees	1937 Per Section Vol.BM	1937 Per A. Vol.BM	Ratio 37/36	1938 Per Section No.Trees	1938 Per Section Vol.BM	1938 Per A. Vol.BM	Ratio 38/37	1939 (Estimated) Per Section No.Trees	1939 (Estimated) Per Section Vol.BM	1939 (Estimated) Per A. Vol.BM	Ratio 39/38
SH-1	8	16,190	24	.84	32	60,160	94	3.92	25	89,940	141	1.50
SH-2	8	27,000	42	.37	12	24,220	37	.88	8	42,350	66	1.78
SH-3	20	11,970	19	.47	12	2,780	4	.21	40	19,870	31	7.75
SH-4	58	68,100	106	.87	78	74,240	116	1.09	25	28,110	44	.38
SH-8	22	12,800	20	---	40	72,520	113	5.65	100	108,120	169	1.50
SH-9	40	29,250	46	1.26	30	24,420	38	.83	97	70,680	110	2.89
Average	26	27,550	43	.63	34	43,060	67	1.56	51	59,850	94	1.40

TABLE II LOSSES IN SPECIES OTHER THAN PINE

Per Acre Basis

Plot	Species	1938 Trees	1938 Vol. B.M.	1939 (Estimated) Trees	1939 (Estimated) Vol. B.M.
SB-1	Douglas Fir	.01	1	.01	2
	White Fir	.01	5	.01	17
	Incense Cedar			.01	3
SB-2	Douglas Fir	.01	5		
	White Fir	.01	6	.05	44
	Incense Cedar			.01	8
SB-4	Douglas Fir	.01	5	.02	22
	Incense Cedar	.01	1		
Av.	Douglas Fir	.01	4	.03	8
	White Fir	.01	4	.02	20
	Incense Cedar	.01	1	.01	4

TABLE III

PLOT LOSS - BURNEY FALLS INFESTATION UNIT
Per Acre Basis.

Plot No.	1938		1939 (estimated)		
	No. Trees	Volume BM	No. Trees	Volume BM	Ratio 39/38
1	.10	104	.13	64	.62
2	.05	13	.19	86	6.62
4	.05	22	.13	155	7.04
6	.15	272	.06	10	.04
7			.13	72	
9					
11	.25	337	.10	409	1.21
12					
SH-8	.05	113	.16	169	1.50
Average	.07	96	.10	106	1.10

TABLE IV

CUTOVER PLOT LOSSES, NORTH SHASTA AREA

Per Acre Basis

Plot No.	Residual Stand Vol. BM	1938 Loss			1939 Loss (est.)		
		No. Trees	Volume B.M.	% of Residual	No. Trees	Volume B.M.	% of Residual
CO-1	3,410	.33	87	2.6	.23	105	3.1
CO-2	1,323	.06	7	0.5	.00	0	0
CO-3	305	.00	0	0	.02	1	0.3
CO-4	887	.14	32	3.6	.05	10	1.1
Average	1,481	.13	31	2.1	.08	29	2.0

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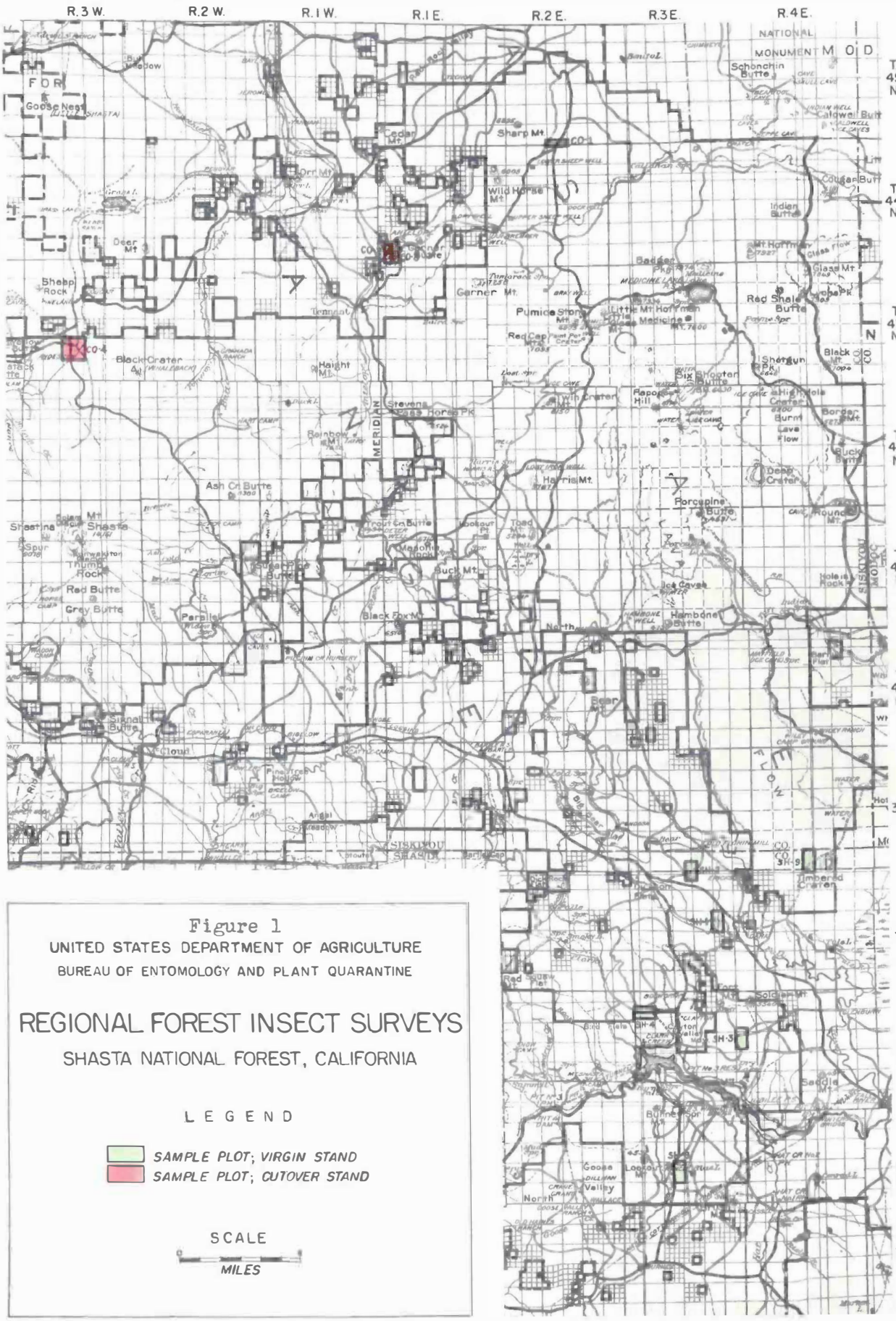


Figure 1

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

REGIONAL FOREST INSECT SURVEYS

SHASTA NATIONAL FOREST, CALIFORNIA

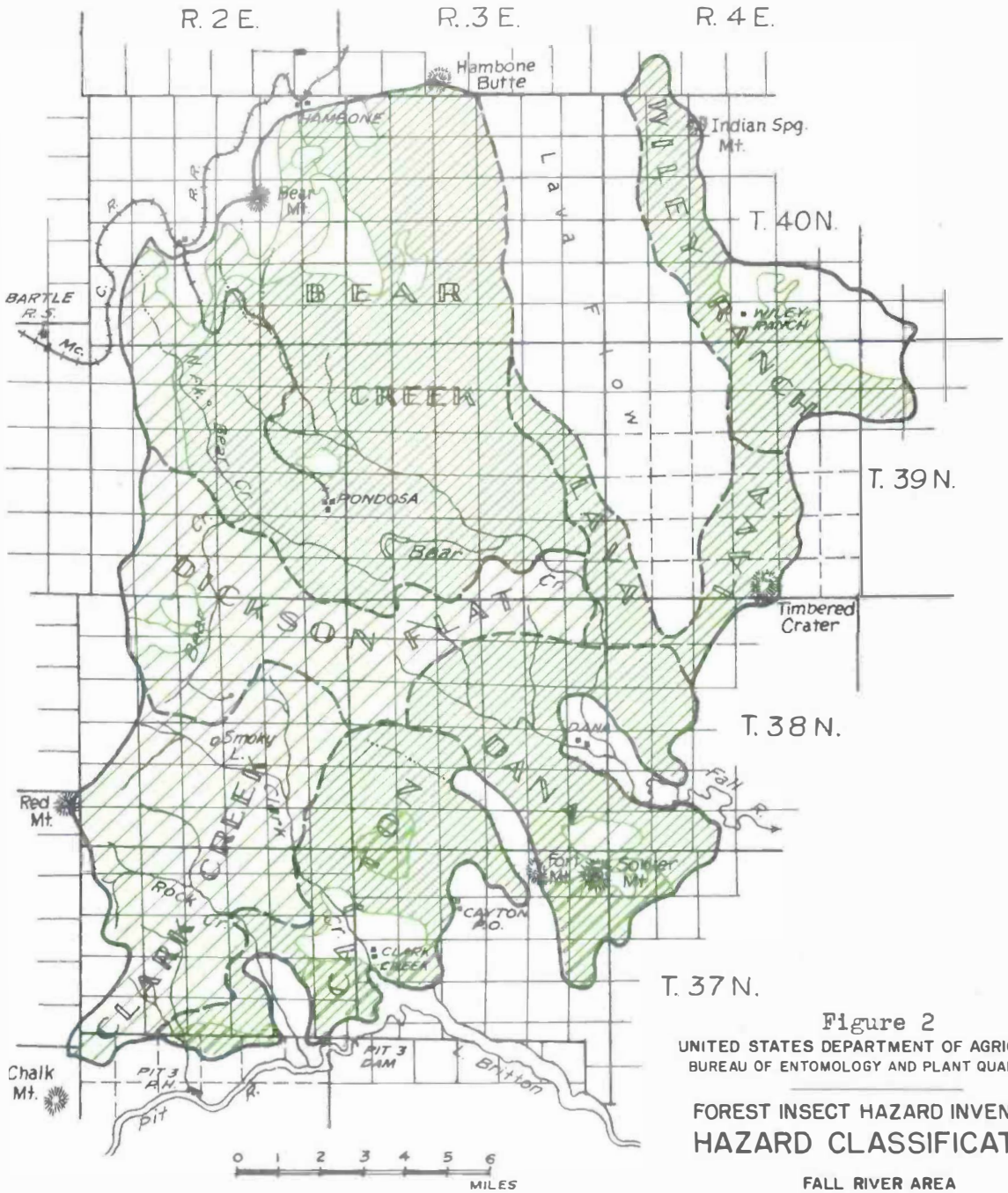
LEGEND

SAMPLE PLOT; VIRGIN STAND

SAMPLE PLOT; CUTOVER STAND

SCALE

0 — *MILES*



—— BOUNDARY - ENTOMOLOGICAL UNIT

Figure 2

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

FOREST INSECT HAZARD INVENTORY

HAZARD CLASSIFICATION

FALL RIVER AREA
SHASTA AND SISKIYOU COUNTIES, CALIFORNIA

L E G E N D

HAZARD II – LOW

HAZARD III – MODERATE

HAZARD IV – HIGH